

9/70



Norris E. Bradbury
Director of the Los Alamos Scientific Laboratory
1945-1970

Volume 7 Number 8
September, 1970

THE ATOM

Published by the University of California, Los Alamos Scientific Laboratory, Office of Public Relations, P. O. Box 1663, Los Alamos, New Mexico 87544. Second Class Postage Paid at Los Alamos.

Editor: Kenneth J. Johnson

Photography: Bill Jack Rodgers
and Bill Regan

Office: D-413 Administration Building. Telephone: 667-6102. Printed by The University of New Mexico Printing Plant, Albuquerque.

Los Alamos Scientific Laboratory, an equal opportunity employer, is operated by the University of California for the United States Atomic Energy Commission.

INTRODUCTION

There is a maxim that may or may not have originated in America which states something to the effect that a story gets better every time it is retold. Certainly most of us have had occasion to witness this phenomenon and know that it is a maxim of some truth. But in the absence of any concrete information as to the degree of truth, probably we can safely assume that the temptation on one person's part to exaggerate a story is no greater than the temptation of another to understate past events, or still another to screen his recollections, cast out temptation, and tell a story of realistic value.

It is in the latter vein that we attempt, in this issue of **The Atom**, to depict Norris E. Bradbury who after 25 years as director of the Los Alamos Scientific Laboratory has resigned effective Sept. 1. We "look" at him as he is seen routinely by friends and associates without amplifying or reducing the stature of his many accomplishments.

The text of this issue was compiled from contributions of several persons including Bradbury. To **The Atom's** request for interview time Bradbury's reaction was the same as if he had been asked for consultation on the Laboratory's budget, plant operations, construction schedules or a personal problem. It was instantly scheduled: "How about in 10 minutes; I've got to run down to Schreiber's (Raemer Schreiber, technical associate director) office first," he said.

Bradbury's office, where this interview and subsequent ones were held, while larger than most at the Laboratory, was as nondescript as any other. The bottom half of the plastered walls were painted blue-gray. The top half was veneered with a few rows of acoustical tile. The floor was covered with the same black patterned tile that covered every floor, including the corridors, of the Administration building. His office was furnished

with blue-green metal furniture. Looking at it from the doorway, his desk and chair were in a far corner. Just inside was a conference table and chairs where interviewer and interviewee sat.

At the first interview, Bradbury sat down in one of the chairs, meshed his fingers on the table in front of him, leaned forward and waited expectantly. After he had heard the first question, he leaned back in the chair, clasped his hands behind his head and planted both feet on the edge of the table. He used the blackboard to illustrate some of his answers, such as the tower operations at Trinity Site where the world's first nuclear detonation occurred in 1945. He animated others, such as by fisting the piece of chalk he was working with at the blackboard and swinging his arm as if he were going to throw it, as he recalled the consternation that had occurred when the plutonium pit could not be inserted in the Trinity device on the first attempt. He placed his index finger over pursed lips while he paced the floor the way Project Y Director J. Robert Oppenheimer did in preparing a short speech for the "E" Award Ceremony shortly after the end of World War II.

When asked to elaborate on his answers he seemed to sense what was needed and elaborations of his elaborations were unnecessary.

Schreiber was an invaluable contributor to the story in providing some background on the director which formed the basis of many questions asked during the interviews with Bradbury. He also wrote letters asking for contributions to the story from several persons with whom Bradbury had formed close associations over his many years as director. Among these letters was one to Bradbury's son John who, with his wife Ellen, gives some insight into "how vacations are spent with father."

Schreiber enlisted the aid of Henry Hoyt, assis-

tant director for administration, who requested information from Robert Underhill, vice president and treasurer, emeritus, of the University of California. Until his retirement in 1963, Underhill negotiated every contract for the University with the Atomic Energy Commission for the operation of the Los Alamos Scientific Laboratory since the Laboratory's inception as the secret wartime Project Y in 1943. Underhill tells of his first meeting with Bradbury and how the director became involved in contract negotiations.

Another contribution to this article came from a short interview with Bradbury's wife, Lois, who tells what he is like at home.

Other information has been provided by the Laboratory's Mail and Records department and by the Public Relations department which has collected publications, newspaper clippings, memorandums, and other miscellaneous materials relevant to the director over the past several years.

The pictures used in this issue also represent the work of several persons. At **The Atom's** request, the director secured a pair of photographs from his parents. One shows Bradbury working at a wood lathe which he still has in his shop at home. It was taken in 1918 when he was nine years old. The other, of him on a motorcycle, was taken when he was about 16. Some of the photographs were taken by PUB-1 Group Leader Bill Regan or by PUB-1 Photographer Bill Jack Rodgers. Some were selected from PUB-1's numerous picture files of past events. Still others were the result of Regan ransacking his office to find reproductions he had made after talking Mrs. Bradbury into looking through personal scrapbooks. The line drawing on the cover is the work of D-3 Artist Hal Olsen.

All of this effort was directed toward this issue in order to relate what makes Bradbury tick, how he ticks, and why he ticks so fast.



To Norris Bradbury, being LASL's director has been A Quarter Century of Fun

By Ken Johnson

A new hire's wife picked him up in front of the Administration building after work. As they drove around the quadrangle he said, "There's the director of the Laboratory." "Where?" she asked while scanning the sidewalk as if expecting to see a man with a sandwich board reading: "Norris E. Bradbury, Director, Los Alamos Scientific Laboratory." "That fast-walkin' guy wearing the 'Truman' shirt," the new hire replied.

At 61, the tall, balding, quiet-voiced Bradbury does walk fast. But then, he does everything fast. He even talks fast. As director of the Laboratory, a post he relinquished effective Sept. 1 after a quarter century, he went through paperwork and other workday chores with miraculous speed. But, at the same time, his work was done with meticulous confidence and scalpel precision. Former secretary Hazel Clancy once said, "You never saw a man go

through a basketful of papers so fast. You'd swear he wasn't reading even a fraction of the stuff. Yet, six months later, he'll remember every detail."

According to his wife, Lois, he is the same at home. "He lives as though he were killing snakes every minute of the day," she said. "Whatever he's doing—washing dishes, gardening, home repairs—it's always zip, zip, zip."

"Even when we travel," she said, "he's no different, especially in a new country. The first thing he does when we get there—that day if there is time, or the next morning if there is not—is to check the transportation system. He takes whatever buses go in all directions and then he comes back and says, 'We'd better look at this, this and this.'"

"After being married to him for 37 years, I've learned that I can go my own pace. I like to stop and look along the way and I know there'll come a



time, when he gets far enough ahead of me, that he'll look around and wonder what happened to his little woman. Then, he'll wait for me to catch up."

Bradbury's son John, and John's wife Ellen, recall a time when they planned a short vacation with "father." "Vacations with Norris are full of rapid movements over long distances; few people travel longer to stay less time. It's almost as if getting there is *all* the fun." John and Ellen had planned to meet Norris in Cartagena, Colombia, on a certain day. "John and I flew down from Miami, but the connections Norris had went to Bogota, then back to Cartagena." The younger Bradburys arrived in Cartagena first. "We waited and waited, left messages at the hotel desk, but no Norris. We learned that the flight he was on sometimes flew Bogota-Barranquilla, or once in a while Bogota-

Cartagena, but all that was last year and 'things had changed.' At dusk we left Norris to make the trip as best he could and looked about the town. If a Bradbury says to meet at a certain place at a certain time that's what he means. We had done our part; we were there. It was sad to think that poor father was slipping or that some fateful event had changed his route.

"He arrived about midnight—probably a few minutes before for the record. Somehow he had gotten the last jet to Barranquilla. His pilot was new, didn't realize how long it takes to stop a jet, and the short Barranquilla runway was not quite long enough. But they stopped, coasting onto a beach and nearly into the mangroves. Norris got the last taxi in town too, I guess, and coaxed the driver to Cartagena.

"Norris and John went out for a quick beer and

Norris Bradbury is "that fast-walkin' guy . . ." third from left.





Zip, Zip, Zip





Bradbury and his wife Lois relax at their home in Los Alamos.

the next day we set out to visit the old city. Sunny weather turned into rain of the most plenteous and permanent kind. Norris, never stopped by a little (or a lot of) rain took us out to an old whitewashed Spanish fort where the 18th century Spanish galleons assembled. We admired it in the rain—we were the only ones to do so—and the lining and glue fell out of John's hat.

"Now did Norris think this adventure was a loss? Not in the least. He had survived a jet landing by a new pilot, outwitted the local travel system and even beat time (by minutes), arriving on the appointed day, and he saw a quaint city in a splendid tropical rain."

"I guess I'm not a very good sitter-arounder," Bradbury said. "I like to cover a lot of ground generally. I'm a nervous tourist."

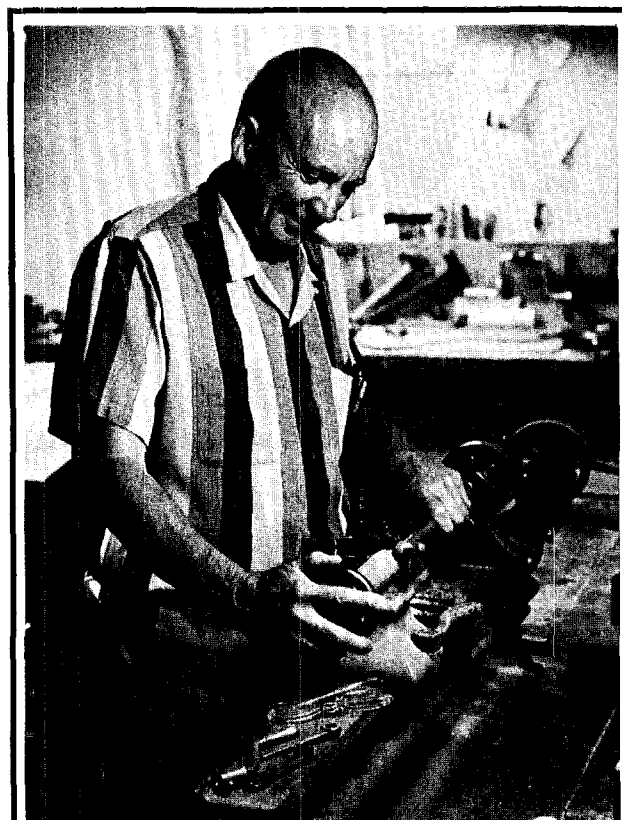
He does sit around some, however. He reads a lot and, as might be expected, he does this fast too. According to his wife he reads a lot of technical publications, although in the past few years "he's become extremely curious about other things. He's been reading Charles Dickens lately, even on the plane when we go somewhere."

Bradbury also has other leisure time interests. He is an amateur archeologist and has made several trips to Mexico where he plies this skill. "I acquired a taste for it by living in New Mexico. There are a lot of old sites around here. Our middle boy at one time thought he wanted to become an archeologist and I traveled around Mexico with him.

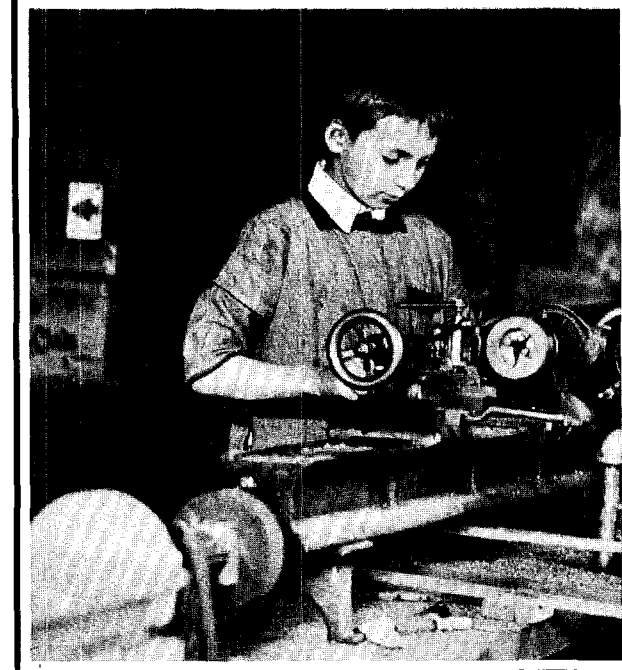
"We usually just cover the roads in Mexico. I have a great interest in visiting the Sierra Madre country—it's peppered with old sites and we have friends there. I like it; it's a change, a different environment, and its on the way to Guatemala, British Honduras and other places we've visited. It suffices my taste to go somewhere new."

Bradbury also enjoys caning. Much of his wickerwork has been the making of new seats for some of the straight back chairs in his home. He also makes some of his own furniture and does minor construction projects and repair work in his home. His workshop equipment includes band and circular saws and a small wood lathe. "I get a great deal of pleasure working with wood. I've taken some pictures of benches and beds and other things at the Museum of New Mexico and copied them. I made beds for our grandchildren. They're colonial style. This means they're not very elegant. A blind craftsman can probably do as well with a dull jackknife," he said with a smile that is spontaneous and often.

As late as the 1950's Bradbury drove to work in



Above, Bradbury works with his wood lathe in the basement of his home. The photograph below shows Bradbury with the same lathe when he was about nine years old. It was taken in his father's workshop in 1918.



a decrepit Model A Ford, picking up children along the way and taking them the rest of the way to school. He was known as "Mr. Los Alamos" (and still is) and the old automobile was known as "the town car." Taking the old car apart and putting it back together again was something he and his sons enjoyed doing together. "It became harder and harder to keep it running so I finally gave it to the Santa Fe High School auto shop. I replaced it with a pickup. I drove the truck to work and all over the Mexican mountains. I've had a pickup ever since."

Bradbury's wide interests and his restless urge to accomplish quickly and with precision whatever he sets out to do is apparently a part of his heritage. His father, Edwin P. Bradbury, has always been "whatever he wanted to be," Bradbury said. "He went to the University of California for approximately a year in about 1902, but he didn't stick. He almost went to sea, but he got a bad cold and the ship went without him. In the early '20's he was a city electrician in Santa Barbara. While climbing a pole he was badly burned when he was working on something and the power, which should have been off, wasn't.

"After he got married he went into the nursery business. He became a landscape architect and practiced in Hollywood. He got tired of that, as he frequently got tired of everything he did, and went to Fontana where he took up ranching. He lived there until about 1935 as a rancher. At one time he had some grape vineyards and grew cactus commercially. Well, then he moved to Pasadena where my mother (Elvira) was brought up. To amuse himself he took a machinist course at night. He was a machinist for years at Cal Tech and worked on the 200-inch Palomar telescope. He realized he wasn't getting any younger and retired in Santa Barbara. Now he makes clocks; he has a house full of clocks. He makes them in a nice little shop there. After he retired he served on the City Planning Commission in Santa Barbara for years.

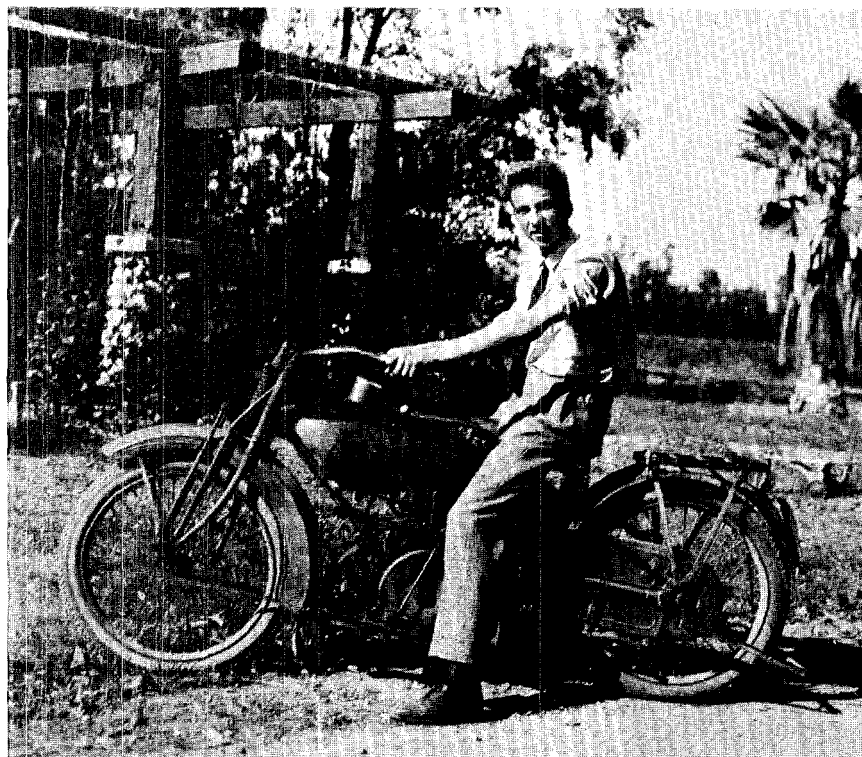
"My father was always a nervous reader and had a terrific memory. He is linguistically skilled. He speaks good Spanish and a bit of French. My mother was a school teacher. She pretty much stopped teaching when she got married and had children. She served on the school board in Fontana, but in those days it wasn't so easy to work and raise children. We didn't have frozen TV dinners and so forth."

Bradbury was born May 30, 1909. His sister died in infancy and his parents adopted twins. "Bobby," he said, "works at an Air Force base in Amarillo,



The Bradbury smile, which is spontaneous and often, was evident even when he was a child held in his mother's arms.

Bradbury, the cyclist, when he was about 16 years old.



Texas, and has something to do with the rehabilitation of helicopters for Vietnam. Betty is chief operator for the phone company in Pasadena and has been for years. Both of them served in the Marine Corps during the war."

Bradbury attended Hollywood High School and then Chaffey Union High School in Ontario, Calif. He was graduated from Chaffey at the age of 16. "I graduated at 16 because when we moved from Hollywood to Fontana, there was a difference in the school years, and birthdays I guess made some difference. Anyway, as I recall, I needed a year and a half of school to graduate. We moved there in the spring and if I didn't graduate a year from the following June, it would have been two years. So, that summer I took some extra courses and finished up in one year."

Bradbury went to Pomona College in Claremont, Calif., and graduated summa cum laude in 1929 with the B.A. degree in chemistry. His scholarship earned him the Phi Beta Kappa Key. Why chemistry? Bradbury said he had a chemistry set when he was about 12, as most youngsters do, but the primary reason was an interest in math and science formed when he was in high school. "In those days" he said, "you went to college to learn to make a living. You took courses you thought might get you a job. Math and science is what I enjoyed in high school. English and history were

courses you took because you were supposed to. What else could I do?"

It was at Pomona that Bradbury met the girl that would become his wife in 1933. "Lois was the sister of my roommate at college. She was engaged to someone else. The engagement fell apart and I moved in," Bradbury said.

"I was an English literature major in college," said Lois. "When I first knew Norris we were both working part-time to get through school. He worked behind a soda fountain that was owned by a redhead named Daisy. He used to make an ice cream concoction called the 'mudroll.' It was called that because it was in a college town and every year the seniors would initiate the freshmen by rolling them in the mud. Norris was a good worker even then. Daisy even offered to make him a partner."

Under other circumstances Bradbury might today be a big man in the ice cream industry, but his life didn't unfold that way. While at Pomona he became intrigued with physics. He did his graduate work at the University of California at Berkeley where he served as a teaching fellow from 1929 to 1931 and a Whiting fellow during 1931-32. In 1932 he received the Ph.D. in physics for his work on the mobility of ions in gases. That same year he was awarded a National Research Council Fellowship in physics.

"When I got to Berkeley," said Bradbury, "I

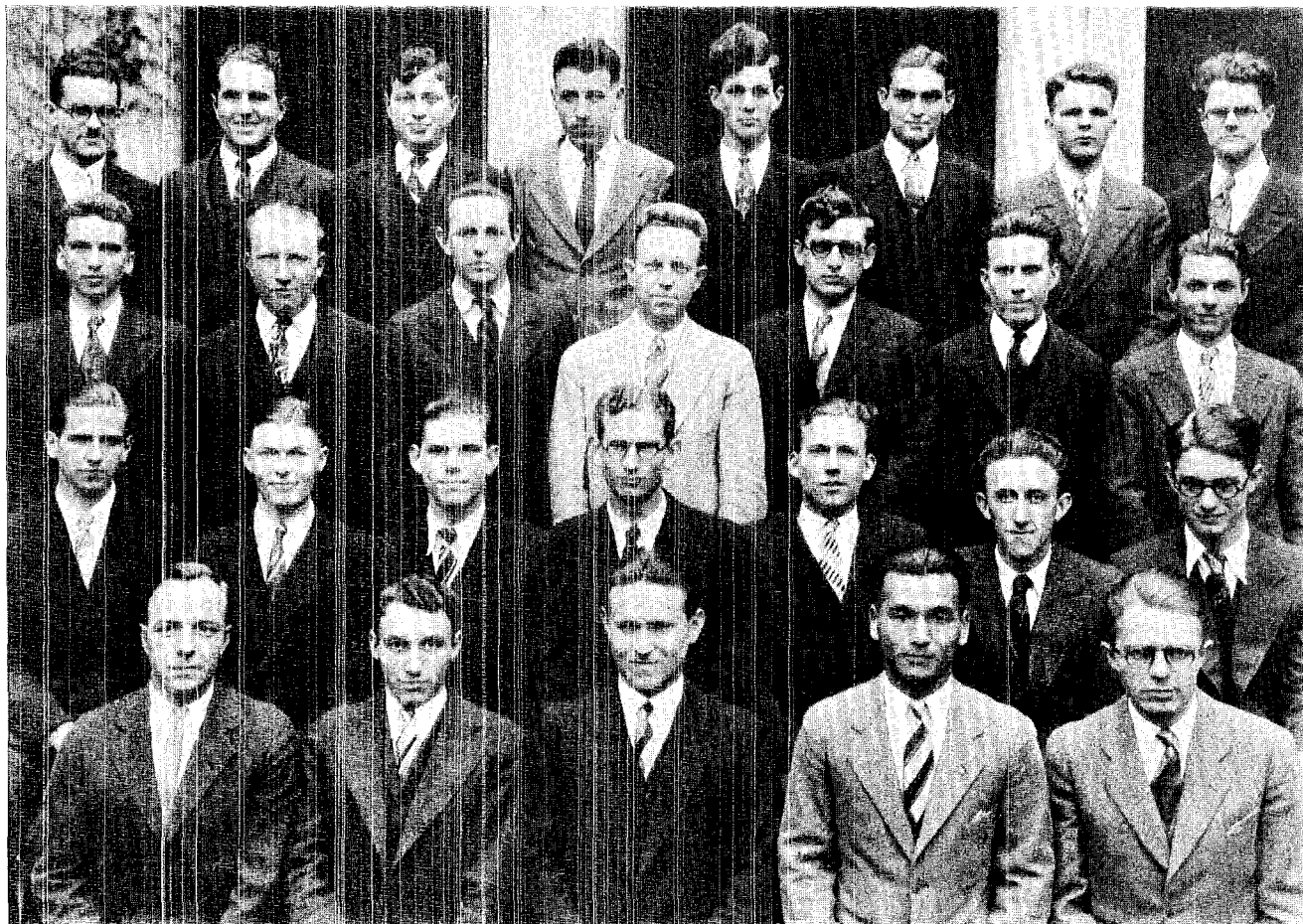
was assigned as a reader to Professor Leonard B. Loeb who taught sophomore classes in physics." Bradbury was considerably influenced by Loeb during these years of his life. He did his thesis under Loeb's direction and started his military career at the professor's suggestion. "Loeb had been in World War I and was a naval reserve officer. He suggested that I apply for a commission and I did. My ensign's commission was signed by a lieutenant commander by the name of Nimitz who was professor of naval science and tactics at Berkeley at that time. I went to meetings once a month and on cruises in the summer. I was an engineering officer; I liked the hot, foul-smelling steam machinery that was below the deck of a destroyer. At Loeb's suggestion I became an ordnance specialist and I was that until I retired from the active reserve."

After graduating with the Ph.D. in physics, Bradbury spent the next two years doing research at the Massachusetts Institute of Technology. In

1935 he was named assistant professor of physics at Stanford University. He had already established a reputation as an expert on conduction of electricity in gases, properties of ions, and atmospheric electricity. He published numerous technical articles on these subjects in journals such as **Physical Review**, **Journal of Applied Physics**, and **Journal of Atmospheric Electricity and Terrestrial Magnetism**.

"About 1940 all reservists were put on notice. I'd been in about 10 years then, and I was called up in early 1941. The Navy let me stay on at Stanford for the academic year, and I started doing work that would be relevant to what I would be doing in the Navy. I was assigned to the U.S. Naval Proving Grounds at Dahlgren, Va. When I got there, I didn't do what I thought I was going to do. Rather, I was assigned to work in exterior ballistics—what happens after a projectile leaves the muzzle of a gun. Projectiles were getting faster and faster and ballistics and firing tables weren't very good.

Bradbury, at left in third row from bottom, is shown with other members of Phi Kappa Alpha, a local social fraternity at Pomona College, in 1928. Second from left in the second row is Duncan MacDougall who is now GMX division leader at the Los Alamos Scientific Laboratory. At right in the top row is Robert Platt, Mrs. Bradbury's brother.



The first round from a gun might be its last, and it was necessary to hit the target the first time. So, this is what I worked on.

"Loeb was at Dahlgren and so was Parsons (then Captain William Parsons who was later associate director at Project Y). In mid-1943, Parsons 'disappeared.' About a year later, I 'disappeared.' Parsons had come to Los Alamos and he sent for me.

"I hadn't had any leave since I'd been at Dahlgren, so I was given 10 days or two weeks in June, 1944. We were visiting my folks in California when I got a telegram from the Navy saying my leave was cancelled. I was to be met in Albuquerque, according to the wire, and I was; Parsons met me at the train. I recall spending two or three days here; I stayed at Parsons' house."

While Bradbury was at Project Y, he was told why he was wanted there, but he wasn't over-enthusiastic about the proposal. "Parsons told me, 'If you don't want to come, don't come.' I thought to myself, 'If this works, we'll never get out of it,' and I dragged my feet.

"I met Lois and the kids somewhere on the way back to Virginia. We had two sons at the time—John and Jim—and Dave was on the way. (John is now an assistant professor of geology at the University of Minnesota; Jim is a physicist for Lockheed in Palo Alto, Calif.; Dave is working on the Ph.D. degree in geography at the University of California in Los Angeles). In Chicago my conscience got the better of me. I got to thinking about the blue uniform I was wearing, and who was I to argue about where I was assigned? I called Parsons and told him I'd take the job.

"I took Lois and the kids back to Virginia to pack up. Then, we started out with six well-worn tires and discarded them as they wore out on the trip up here, and I didn't have any more gas coupons when I got here. We could get tires then and we were given gas coupons enough so we could get to Santa Fe once a month. People got together for trips so we got to Santa Fe now and then.

"At first we lived in one of the Sundt apartments which have since been torn down. They had showers and were over-heated with coal-driven furnaces, but lasting friendships developed there.

"Later we lived in one of the houses on Bathtub Row (so-called because they were the only houses at Project Y with bathtubs). It had been the arts and crafts building for the Ranch School and had been divided into two homes. It became vacant and I applied for it. Oppie (Oppenheimer) said I could have it if Fermi (Enrico Fermi who achieved

the first sustained nuclear reaction) didn't want it. Fermi said he didn't want it because it was rumored to be a cold place to live."

During the war years when scientists at Project Y were developing the atomic bomb, the best technical personnel available were being recruited from universities and industry with desperate rapidity. "I guess I was picked for the Project because I had worked with Parsons, had had some chemistry, was a physicist, I knew a little about nuclear physics and I had had some ordnance experience at Dahlgren," said Bradbury.

One of many military personnel assigned to the Project, Bradbury was placed in charge of the implosion field-test program. He later headed the assembly of all non-nuclear components of the implosion nuclear device.

Project Y efforts progressed to the point where scientists were faced with the question of whether there was any basic flaw in the concept of a nuclear explosion. If not, the gun-type design was essentially certain to work, but the implosion idea (a subcritical mass of plutonium compressed to super-criticality by high explosives) had many technical problems. If an implosion system could be tested successfully, the gun design was bound to work too. This test—named Trinity—was conducted July 16, 1945, near Alamogordo, N.M.

Bradbury, in recalling his experiences at the Trinity Site, said, "Several months before the actual test there was a 100-ton high-explosives shot scheduled for the purpose of calibrating instruments and taking other measurements that would help us in organizing for the Trinity event. We in the explosives division had a direct interest in getting that shot set up and detonated. As I recall, it was sometime in April that we went down there to set it up and this was my first introduction to the site. It was hot, dry and dusty; tracks in the sand were the only roads. We were living in 16' x 16' hutments which were also hot. The only thing pleasant about the place was the beer we drank.

"There was nothing to do there but work and there was nowhere else to go. The road getting in there was rough and security between Los Alamos and Alamogordo was extremely severe. We were forbidden to stop anywhere on the road between these places, although we probably did stop for a meal or something, but we were careful about it.

"After the 100-ton test we started to organize for Trinity itself and I was assigned responsibility for developing the procedures and for supervising the assembly of the device, except for the nuclear components which were to be put in at the base of

tower at the site. I was to develop the SOP's (Standard Operating Procedures) to get the thing on top of the tower and to finish assembling it up there.

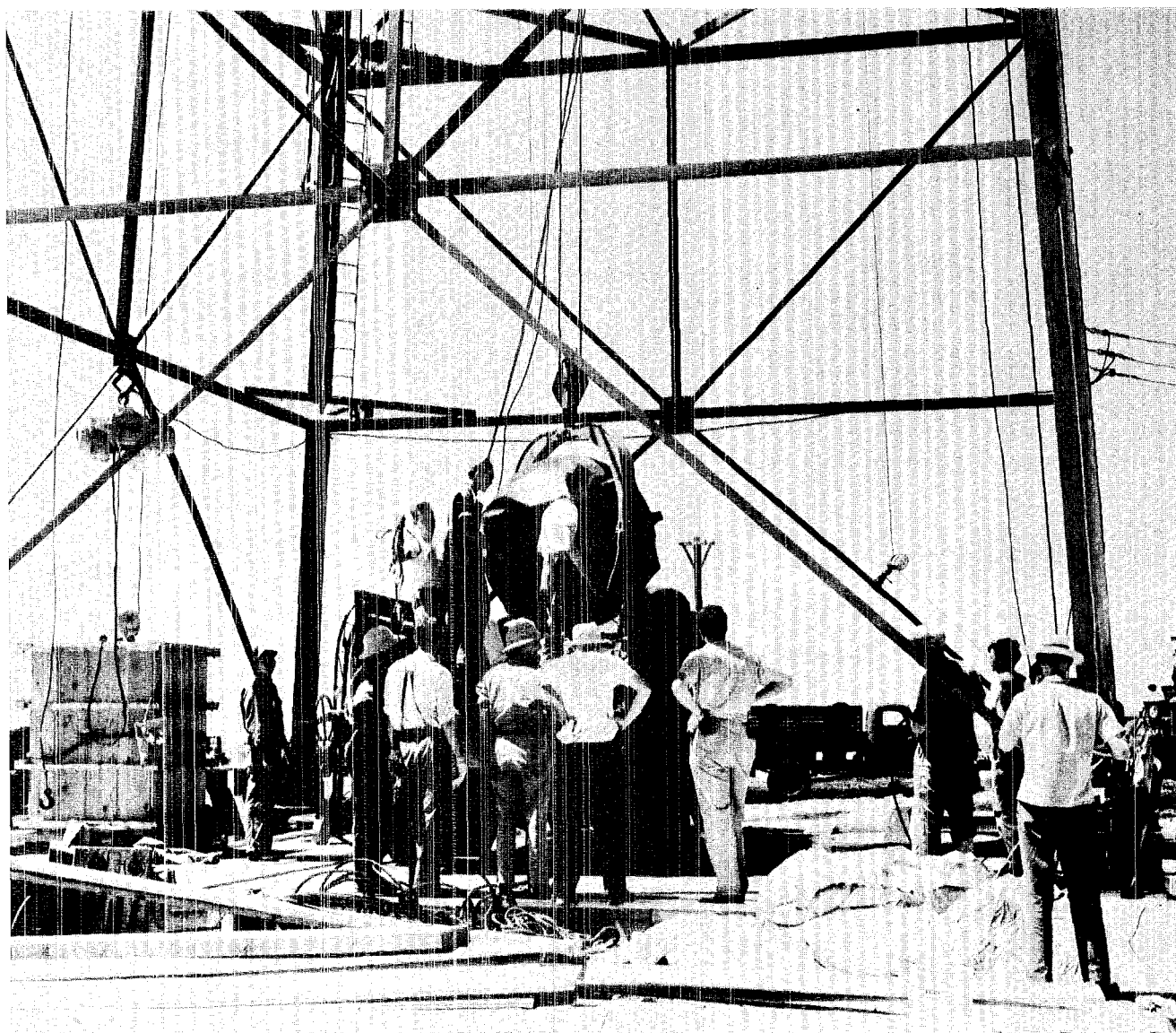
"It was quite a little undertaking that started back here (Los Alamos). We had a dry run in assembling it in a building that is still here at S Site to be sure the thing would go together. We put it together without the final nuclear parts. A hole was left so that the nuclear components could be inserted later.

"We loaded it on a five-ton truck and three or four days before the actual test date started out for Alamogordo. At the site we parked the truck in a building overnight, and the next morning went to work at the tower. We backed the truck under the

tower, lifted the assembly off the truck with a hoist mounted at the top of the tower, pulled the truck out, and lowered the device on the floor. We were scared to death that we would drop it because we didn't trust the hoist and it was the only bomb immediately available. It wasn't that we were afraid of setting it off, but we might damage it in some way.

"We set it in a cradle on the floor and then the boys from the ranch house (the MacDonald ranch house served as assembly headquarters for the nuclear parts) came over to put the plutonium in it. For a while there was a good deal of consternation because when they first tried to put it in, the damned thing wouldn't fit! As it turned out, the

Beneath the Trinity tower, the implosion device is hoisted from the bed of a truck. Bradbury, wearing khaki, is fourth from left on the tower floor.





Bradbury and Raemer Schreiber, technical associate director, posed for this photo at the MacDonald ranch house during a visit to the Trinity Site in 1967.

problem was simple; the plutonium was hot and had expanded. After some cooling down, it did fit just as it was supposed to.

"We plugged the hole then with the rest of the HE blocks, and buttoned it up. We began to hoist it up the tower and this is where we were really scared because if we had dropped it, we might have had a catastrophic mess on our hands. So, we lifted it a few feet and put several layers of GI mattresses all over the floor of the tower. Then we hoisted it through a hole in the floor at the top of the tower, replaced the floor and set the bomb down on it.

"Well, the worst was over, except it was a 100-foot walk up the tower; there was no elevator, just a ladder on one side, and it was hotter than hell in July. Some of the boys went up to put on the detonators and some other diagnostic stuff, and that was, for the most part, the end of my job there.

"We didn't trust the detonators very much so we had a lot of diagnostics connected with detonator behavior and, of course, there were a lot of other experiments there to diagnose the bomb's nuclear behavior. If there was a failure in the system we would have some way of knowing what it was that failed.

"The firing date was delayed, maybe a day, because a diagnostic cable broke. We had to find it, dig it up and fix it. It didn't have enough slack in

it when they laid it in the trench and covered it up, so the weight of the dirt broke it. It was a small crisis and I don't remember that there were any others of this type.

"A day or two before the Trinity shot we had an important laboratory experiment up here (in Los Alamos). It was designed to test the behavior of a system like the one at Trinity. But we couldn't make any sense out of the results; they were either very bad or they were uninterpretable, so we decided to ignore them. All of our previous experiments indicated we were on the right track. It wasn't until several months later, we found the experiment had serious flaws; it couldn't have told us anything, it didn't tell us anything, and we were quite right to ignore it."

On the night of July 15, when Bradbury and other scientists and military personnel had finished their jobs, they went to sleep on hillsides several miles from ground zero. It was cold and there was a drizzling rain. "The weather was so dismal, we didn't expect the shot to go that night and we were tired," Bradbury said. "I didn't know it was going to go until about five minutes before it did. Somebody woke me up—I don't remember who—and I just had time to get out of my sleeping bag and to face away like we were told to when it went off.

"A lot of us compared what we saw, what we felt

and what we heard with the 100-ton shot, and we made guesses among ourselves on the hillside out there about the yield of the bomb. Some of us thought it to be about 10 kilotons. Other guesses ranged from five to 20 kilotons.

"For me to say I had any deep emotional thoughts about Trinity . . . I didn't. I was just damned pleased that it went off." In retrospect, Bradbury said, ". . . Most experiences in life can be comprehended by prior experiences, but the atom bomb did not fit any preconception possessed by anybody. The most startling feature was the intense light.

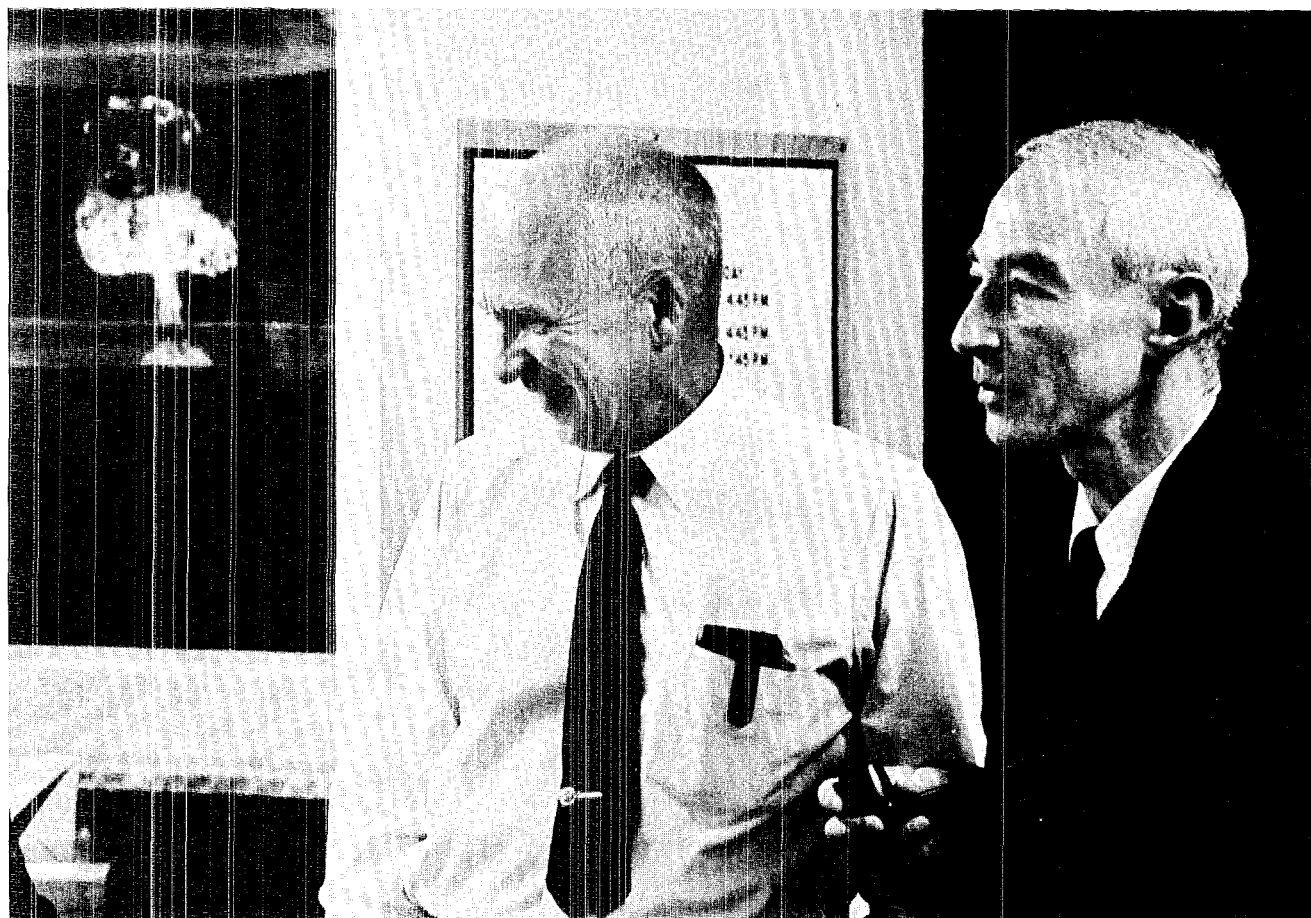
"One thing I've never understood, never tried to . . . I drove into the yard at home, got out of the jeep, and Lois came out the back door and said, 'Well, it worked, didn't it?' It had been an undercover operation and, of course, you never told your wife anything, and possibly no one did, but our success had gotten around up here pretty fast."

Mrs. Bradbury well remembers the incident. "Everybody was going up in the mountains to see something. Mrs. Ed McMillan and I both had

young children and we couldn't find any baby sitters. We were frustrated because we couldn't go. So, we took turns going out once in a while to see what we could find out. Finally, Mrs. Parsons called us and told us that whatever it was, worked. So, when I went out the back door and told Norris, 'It worked, didn't it?' I didn't know what it was that had worked. It just seemed like a good idea to say it."

Following Trinity, the atomic weapons "Little Boy" and "Fat Man" were completed at Los Alamos and then dropped over Japan. The war ended in the Fall of 1945 and technical activity at the Laboratory slowed. Universities and industry, whose staffs had been seriously depleted by wartime efforts, were rebuilding. Many scientists had standing offers to return to their pre-war jobs and even those who didn't were made offers that included tempting sums of money. The University of California which had accepted operation of the Laboratory in wartime gave no indication that it was willing to continue its operation. The future of nuclear energy was just as uncertain and the gloom

Bradbury accompanied J. Robert Oppenheimer through LASL's science museum and exhibit hall in 1964.



precipitated faster when Oppenheimer announced in October of 1945 his intention to resign the director's post.

"About 4 p.m. one afternoon, Oppie called me in and asked me if I'd be willing to take on the directorship," Bradbury said. He had contacted Groves (the late General Leslie R. Groves, director of the Manhattan Engineer District) and I don't know who else.

"I was anxious to get back to Stanford, but I said I'd think about the offer. I talked to Lois, Fermi and others to see what they thought of the idea. Then I told Oppie I'd take it for a short period."

It was then that Bradbury made his "six months" statement in which he agreed to be the director of the Laboratory for six months, or until such time as a permanent man was found—whichever came first.

In October of 1960, Oppenheimer was among the many well-wishers to congratulate Bradbury on his 15th year as director of the Los Alamos Scientific Laboratory. In a letter to Bradbury, Oppenheimer wrote:

"It was fifteen years ago that you and I first talked of the possibility—to me the desirability—of your taking over the direction of the Los Alamos Laboratory. I remember your hesitations, and your reluctant agreement to do it for some six months.

"Even more, I remember your first visit to Los Alamos, at the invitation of (then) Captain Parsons. More than anyone else who came to Los Alamos, you expressed, with force and eloquence, your misgivings about what we were up to, and your reluctance to be involved in it.

"Now fifteen years have elapsed, and you have earned the respect, the gratitude, and the affection of the many men and women who have worked in the Laboratory, and the appreciation and indebtedness of all of us, both for what the Laboratory has undertaken and accomplished, and for the spirit in which it has done so. The seriousness with which you entered on these responsibilities has contributed very much to the way in which you have met them."

Said Bradbury, "Groves confirmed the appointment. Oppie wanted to leave right away and I was still in the Navy. Parsons got me out in nothing flat. I was at the separation center in Los Angeles from about 8 a.m. until 1 p.m. one day and that was it. I had 15 years in the service then. Eventually I finished out 30 years in the active reserve.

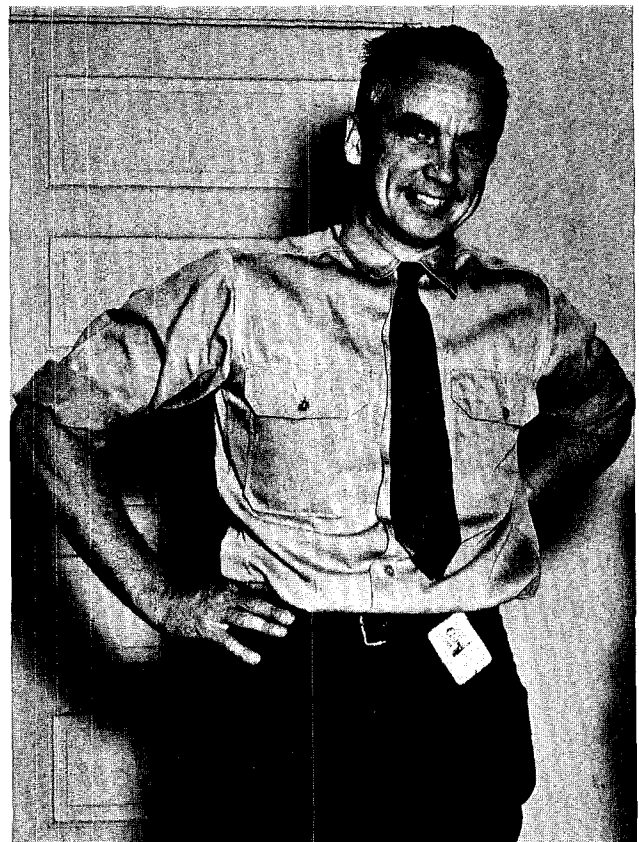
"For a while, I wore uniform shirts without insignia. I didn't have much in the way of civilian

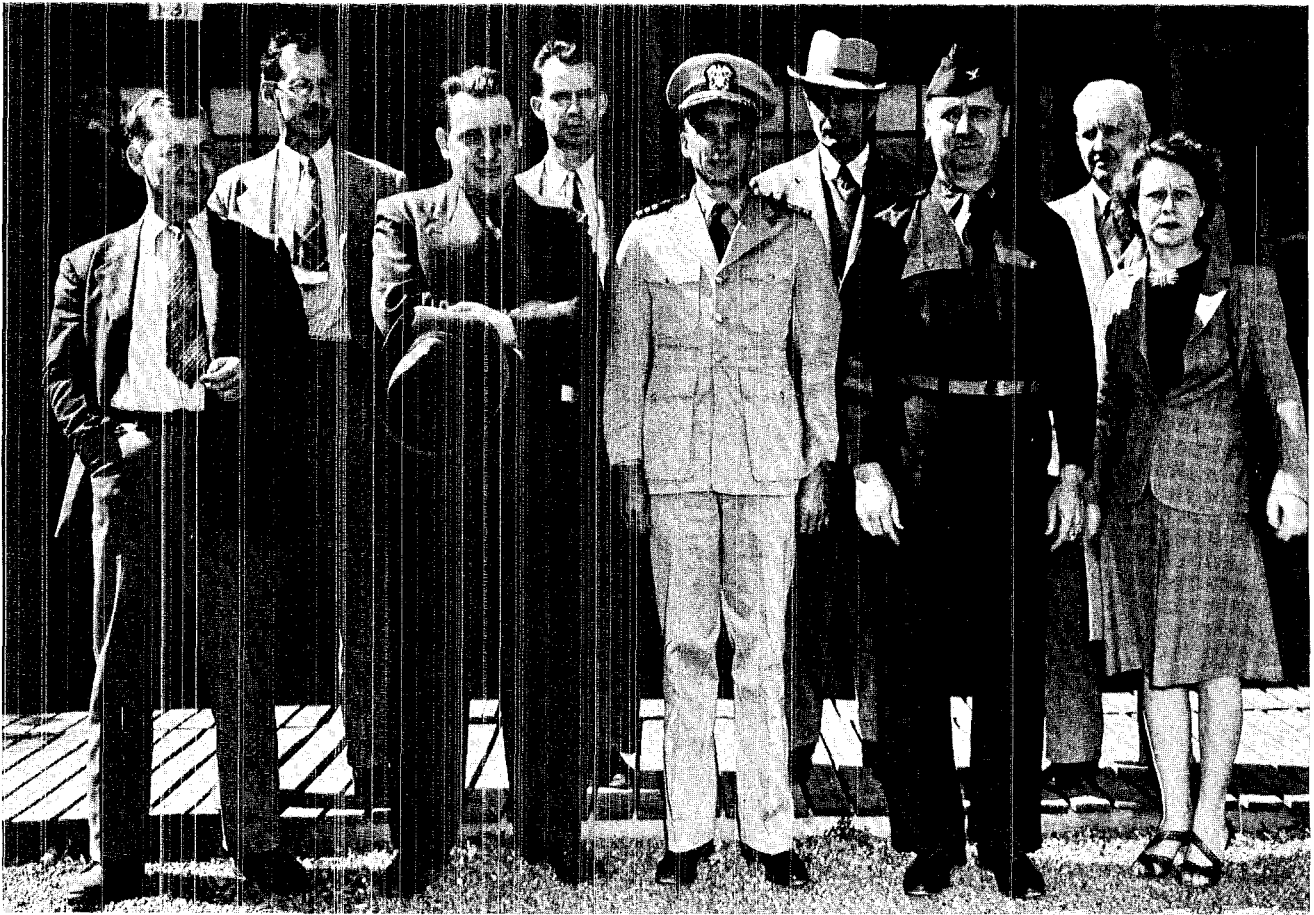
clothes. But then, nothing was like it is now. Mail and Records consisted of a couple of filing cabinets in Oppie's office.

"The University of California wasn't asked about my appointment. I didn't know this until about two years later. The University almost threw in the contract."

Many University officials met Bradbury for the first time after he had been appointed. Robert Underhill, vice president and treasurer, emeritus, of the University who negotiated every contract for the Laboratory from its inception until he retired in 1963, remembers his first meeting with the newly-appointed director: "While I visited Los Alamos almost every month from March, 1943, for over two years, I did not meet Norris until the day of the "E" Award Ceremony after the war. My contacts had always been with Dr. Oppenheimer and his top administrative staff and the Manhattan District officers. The conscious and evident intent to keep me as an outsider from as many contacts as possible during the war were so effective I did not, at that time, see or even know of a Dr. Bradbury. My first knowledge of such a person was when

"For a while I wore uniform shirts without insignia. I didn't have much in the way of civilian clothes."





Navy Commander Bradbury, who was named to be the new director of Project Y, and Colonel G. R. Tyler, post commander, posed with newspaper reporters in 1945.

General Groves took it upon himself to appoint a Dr. Bradbury as the University of California's project director. And so, University President Robert Gordon Sproul and those of us invited to the "E" Award Ceremony met him on Oct. 16, 1945."

The "E" Award was Army-Navy recognition of exceptional performance on the production front during wartime and was accompanied by the War Department Scroll. President Sproul accepted the "E" flag from Groves, and Oppenheimer accepted the scroll from Admiral Parsons. Oppenheimer's acceptance speech left a lasting impression on Bradbury. "The strange thing about that speech," said Bradbury, "is that Oppie made it, not quite on the spur of the moment, but with about five minutes thought. To my mind it was a touching speech, a very real one and a very true one. I'll always treasure it."

At that time Oppenheimer said:

"It is with appreciation and gratitude that I accept from you this scroll for the Los Alamos

Laboratory, for the men and women whose work and whose hearts have made it. It is our hope that in years to come we may look at this scroll, and all that it signifies, with pride.

"Today that pride must be tempered with a profound concern. If atomic bombs are to be added as new weapons to the arsenals of a warring world, or to the arsenals of nations preparing for war, then the time will come when mankind will curse the names of Los Alamos and Hiroshima.

"The peoples of this world must unite, or they will perish. This war, that has ravaged so much of the earth, has written these words. The atomic bomb has spelled them out for all men to understand. Other men have spoken them, in other times, of other wars, of other weapons. They have not prevailed. There are some, misled by a false sense of human history, who hold that they will not prevail today. It is not for us to believe that. By our works we are committed to a world united, before this common peril, in law, and in humanity."



Bradbury confers with General Leslie Groves in 1947.

The following day, on Oct. 17, 1945, Bradbury assumed direction of the Laboratory. "We weren't really doing much of anything very progressive then," Bradbury recalls. "What held the place together was the Navy's program to determine the effects of nuclear bombs against naval vessels."

The Laboratory had been informed of this test—called Operation Crossroads—in December of 1945. Preliminary meetings were held that month and in January of 1946 to set up a joint task force operation. The Laboratory was to provide the atomic weapons and undertake the technical direction of the test.

"When we went to Washington," Bradbury said, "to talk to the task force people about Operation Crossroads, we flew from Kirtland in Albuquerque in an ancient B-29. It was one of those flights where the crew said, 'Thank God; we made it,' after take-off. We were riding in the bomb bays of the plane. It lost an engine somewhere over the Mississippi river and then we lost half of another—the propellers couldn't be adjusted and it was running at about half power. The wind was blowing and it was snowing all over the country. The pilot was a nervous wreck. We had parachutes but that wasn't very comforting because who would ever have found us in a snowstorm? Well, there was another passenger on board who had considerable experience flying B-29's and was apparently familiar with that part of the country. He thought there might be a chance of landing somewhere in Ohio. He took the controls from the pilot and took us in. He missed the runway on the first pass and made kind of a fighter-plane landing on the second. We bought drinks for everybody and took the train the rest of the way to Washington.

"That was the start of Operation Crossroads. When I came back from that trip, the water system in Los Alamos was froze up." The water line from Guaje Canyon remained frozen for several weeks. Tank trucks brought water from the Rio Grande river to the community's old water tower. Some was put into the system and some was doled out to housewives in pots and pans. This event climaxed bitter resentment toward living conditions in Los Alamos and probably hastened the exodus of many persons already unhappy with community operations.

"Operation Crossroads came off in the summer of 1946," said Bradbury "it gave me something to put people on and I needed all the good people I could get so I said nothing that would rock the boat at that time. When I made my "six-months" statement upon becoming director, I didn't think

I wanted to be the director; I thought I wanted to get out. But, I decided I couldn't run a laboratory that would have a future unless I was willing to put my own future on it. It needed a man that believed in it himself before others could believe in it.

"After Crossroads I thought I could afford to lose those people who couldn't make up their minds whether they wanted to leave or stay. I made my so-called 'tree-shaking' statement then: 'pack up and go, and we'll pay your way home; otherwise, stay and get down to the big job that has to be done.' They'd all been hired during the war with the promise of return travel home whenever they terminated. What I did was to stop return travel as of a certain date."

Although Bradbury's staff had successfully completed its large part in the Crossroads test series, and he had now formed a nucleus of scientists dedicated to the future of Los Alamos, not all members of the newly-formed Atomic Energy Commission felt the same. On the Laboratory's 25th anniversary in 1968, AEC Chairman Glenn T. Seaborg commented: "I recall that when I joined the Commission's first General Advisory Committee as the most junior member of an otherwise illustrious group, Los Alamos was one of the first subjects of discussion. Some of my colleagues maintained that it would never be possible to make Los Alamos attractive for competent scientists. It was too remote from civilization. The wartime buildings were already falling to pieces, and the cost of building permanent structures in such an isolated spot would be too costly. Furthermore, most of the 'big name' scientists had left Los Alamos with Oppenheimer. Those remaining might be competent young men with more than average ability, but they could hardly be compared to the giants of the war years. To be specific, some of the GAC members questioned the capabilities of the young Navy commander who had succeeded Oppenheimer as director. Norris Bradbury was an excellent physicist and had done an outstanding job on the Trinity test, but could he fill Oppenheimer's shoes? In early 1947 at least a substantial minority of the GAC believed that neither Los Alamos nor Norris Bradbury would long be on the atomic energy scene."

To second-guess what would have happened if the University of California had not renewed its contract to operate the Los Alamos Scientific Laboratory under the newly-formed Atomic Energy Commission, one might have seen the GAC minority's prediction come true. But Bradbury was

aware of the forthcoming expiration of the contract and of how little contact he had with the University. "The contract was only a couple of pages long," he said, "and I was aware of a gentleman in the business office named Al Dyhre who seemed to be in contact with the University. Dyhre worked for Bob Underhill. Underhill and I later became close friends.

"By 1947 I guess the University had decided that 'this Bradbury fellow' could be trusted or something because I was asked to help negotiate the next contract. Underhill said something to the effect, 'Now look, you get busy and help us negotiate this contract. You've got to live with it.'"

Underhill, who had negotiated the first contract for operation of the Laboratory during the war, recently noted, "The contract which I negotiated and signed in 1943 had a clause whereby the University could terminate three months after cessation of war with the Axis powers and the University served notice of termination since there was a serious question about operating outside California except under the necessities and liberalities due to war conditions. It also seemed inappropriate to operate a laboratory with no close contact

The director accompanied Robert Underhill during Family Days at the Laboratory in 1965.



with the operation and no actual direction. But the withdrawal was cancelled and I think this is where my acquaintance with Norris really started.

"After assurance the University would no longer be a 'mandatory' contractor and the operation would be subject to University general procedures, I met with Dr. Bradbury in his office in January of 1948 to review a contract draft. To say he was horrified is putting it mildly. The two page document appointed the AEC manager in effect the prosecuting attorney, judge, jury, and executioner and the contractor in effect a slave. That started Norris as a contract negotiator and a great man on that team.

"At Eniwetok I sensed that Norris, like a Navy captain, ran a tight ship and some members of the team did not voice disagreement. A man was in my room inappropriately expressing some disagreement when he heard someone greet Norris on his entrance to the building. The window was open and my companion took a quick dive out and disappeared."

It was in the early 1950's after the Russians detonated their first nuclear device that Los Alamos was again immersed in an urgent program of developing a bomb—one more powerful than the atomic bomb. This was the hydrogen explosive which was successfully tested in 1952 at the Eniwetok Proving Ground. "Until the Russians detonated their bomb," Bradbury said, "the U.S. was enjoying a lead, and to build the hydrogen bomb meant re-establishing that lead. We started to spend more money and we went on a six-day week for about a year and a half. At the time we didn't know how to build a thermonuclear device."

Bradbury said that the building of the H-bomb is the Laboratory's greatest achievement since Trinity. "Anyone who knows what a critical mass is can build a fission bomb. But, we didn't have anywhere near that degree of knowledge when we started the development of the H-bomb. Comparing the two is like comparing apples and oranges. Both were monumental achievements, but they were 10 years apart; they were started with different degrees of knowledge and from different points. Like the wheel we take them for granted now."

Following the detonation of the first hydrogen device—nicknamed Mike—there were major laboratory and community improvements. A new technical area was built, and in 1957, the security gates which closed Los Alamos to the outside were taken down. Los Alamos was an "open" city. "Nothing really changed as far as the director's civic

responsibilities were concerned until Los Alamos became an incorporated county," Bradbury said. "Then almost anything the director had to do with the community—like housing—kind of went away.

"The AEC made the mistake of taking a vote of the population to decide whether they wanted the gate open or not. The population voted against it quite heavily. The people were afraid the women and kids wouldn't be safe on the streets at night and things like that. They liked the security the fence provided; the kids liked it and looked forward to the time when they could have a badge. The AEC opened the gate anyway. The only thing I remember that was highly amusing was that it had only been open a couple of days and we had our first major burglary. The people who voted against opening the gate were saying 'ha, ha, we told you so; we told you so.' They caught the burglar, and as I recall, it was an ex-security guard."

It was also during 1957 that the Russians were successful in launching their first "Sputnik" satellite. Bradbury explained what impact this had on the Laboratory. "It rescued the nuclear rocket program, although we didn't really have one. After the hydrogen device had been detonated we were asked how small and with how big of a yield we could make them. We did some feasibility studies, looking at nuclear rocketry for surface to surface missiles, but it proved to be too doggoned expensive. We put in at least a couple of years on it and we were just about ready to put it back on the shelf and forget it.

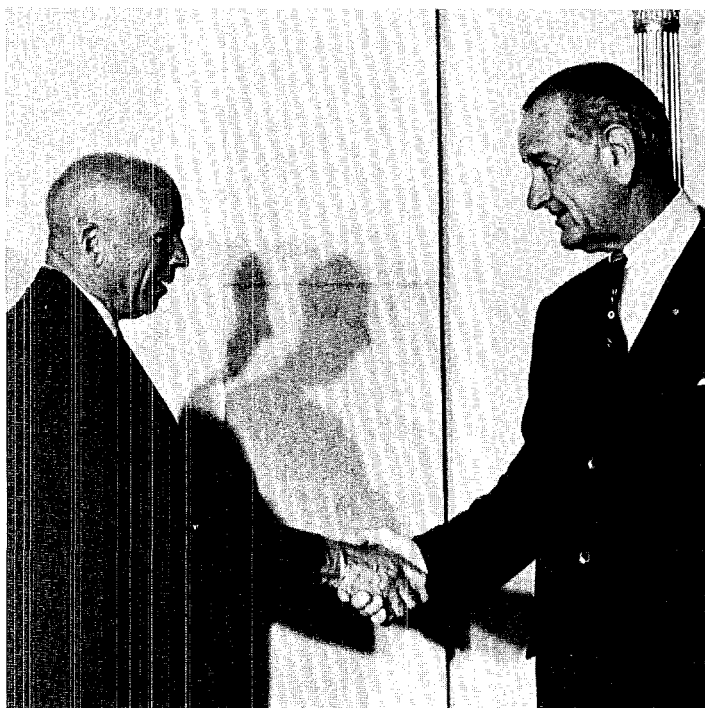
"To add something like the nuclear rocket program made a big change in Laboratory activities and it meant more money. At one time we were spending \$30 million a year on the Rover program.

"The Meson Facility is of comparable size to what the Rover program was and will be a wonderful thing for the Laboratory to have. The Meson Facility will increase our fundamental research. It also has applications for applied research and for medicine. I don't think there is any overall trend in the Laboratory toward either applied or basic research. What's obvious is a trend toward diversification. We have many more projects than we did 20 years ago. Many of them are quite small, and many more of them are unclassified. In that sense we're becoming more like a national laboratory. Weapons research, after reaching a certain level about five years ago, has more or less leveled off. It now represents a lesser percentage of the Laboratory's total work.

"In the long run, the question the Laboratory may have to face is, what happens and what re-



Above, Bradbury listens to President John Kennedy give a pep talk to Project Rover scientists at Los Alamos in 1962. At left is Glenn Seaborg, chairman of the Atomic Energy Commission. At right is Senator Clinton Anderson.



Bradbury shakes hands with President Lyndon Johnson at a White House reception in 1966.

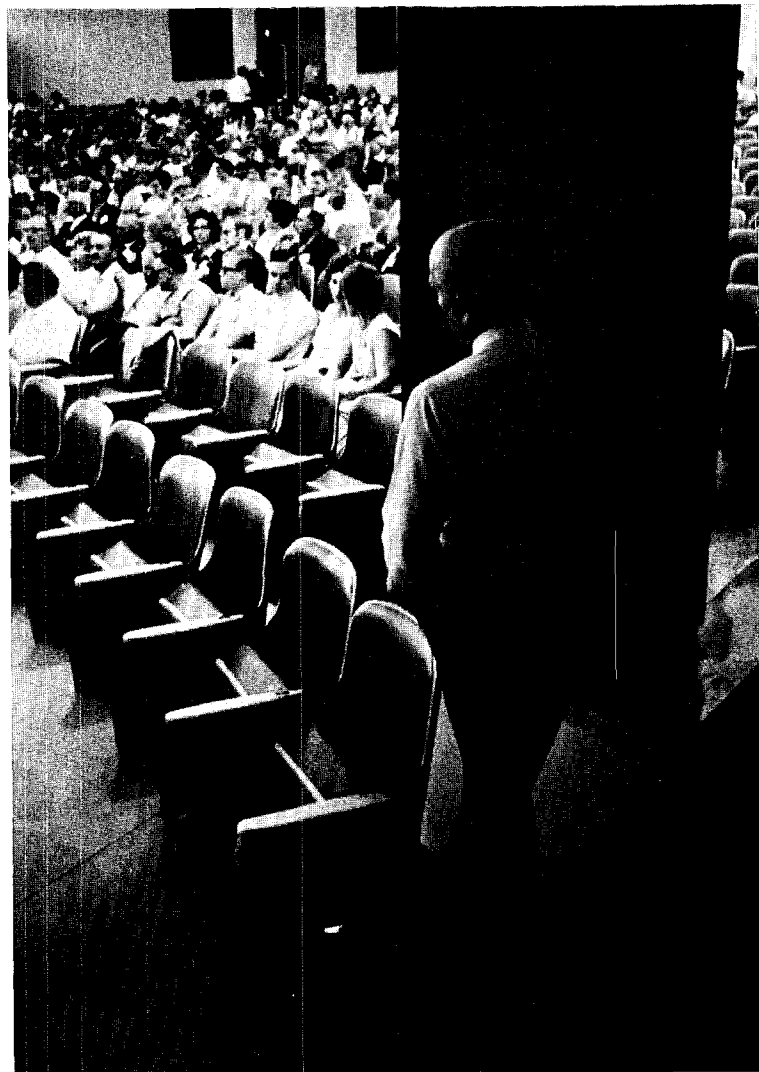
sponsibility to the country will it have if a complete test ban treaty is signed. For a few years there would probably be no difficult problem. But later would come the question, 'With no testing, what do we need a weapons laboratory for?' Things like Rover, the Sherwood program, and the Meson Facility are other ways to play a national nuclear role.

"Science rode high after the war . . . we could do no wrong. Now people think about other things. The post-war years may have been the golden age for science and scientists and we may or may not have deserved it. Now maybe we're in the iron age. We may not deserve that either. But, we still have it pretty damned good."

Bradbury has always seemed to have a "feel" for the needs and desires of the general public. It was through his direction that the Los Alamos Science Museum and Exhibit Hall was established. The museum has grown rapidly in both size and visitations since it was established. In 1969 nearly 80,000 people from throughout the United States and some foreign countries toured the facility. "We established it for public relations," he said. "The public didn't know what we were doing up here and we had a lot of stuff around that we could put into a showcase. It seemed like a nice thing to do and we could show the taxpayers what was going on at the Laboratory."

He has granted numerous personal interviews to members of the news media, probably more than usual just prior to the 25th anniversary of Trinity last July. On an occasion when the Public Relations department had been contacted for a statement on Trinity from the director, Bradbury was hailed in the corridor as he was rushing back to his office. "Fiddle-dee-dee," he said jokingly, "I hate to talk about bombs on a hot day." He paused briefly, and then he rattled off a short statement. He waited while it was typed out. Then he looked at it and said, "Aw, we ought to do better than a sentence or two for them," and raced down the corridor with the sheet of paper in one hand, tickling the cement block walls with the index finger of his other. He returned minutes later with a longer statement he had roughed out on his own typewriter.

Bradbury has been a "regular" at the annual Science Youth Days, when high school students from the southwestern part of the United States are invited to tour Laboratory facilities. He has told the assembly of students many times, "If you don't find science to be fun, don't go into it; it's hard and the financial rewards aren't great."



Prior to welcoming ceremonies at the 25th anniversary reunion of Las Alamos military veterans last June, Bradbury, with his suit coat slung over his shoulder, scanned the audience in Civic Auditorium, looking for familiar faces.

"If you don't find science to be fun, don't go into it; it's hard and the financial rewards aren't great."



Although Bradbury occasionally wears a suit, he is usually neatly clad in a sport shirt and slacks. "We might as well be comfortable," he said. "Who are we trying to impress?"

No task is slighted by Bradbury and no one is given the 'brushoff.' Whether it is a Laboratory problem or a personal problem of one of his staff, he is always ready to listen.

The Laboratory grew up informally. Although its staff includes many doctorates they are not referred to as "doctor" or by any other title other than their names. Bradbury also frowns on frills and fringes as evidenced by the lack of air conditioning, drapes, ornate furnishings and other niceties in his own office. According to his wife, he is the same way at home. "I've asked Norris about such things as a dishwasher and a garbage disposal," she said, "but he always says, 'What do we need that for? We can do our dishes,' or 'What do we need that for? I can carry out the garbage.'"

"It's been fun," said Bradbury about being director of the Laboratory. "If it hadn't have been fun, I wouldn't have stayed as long as I have. You get a kind of vicarious pleasure from the Laboratory's successes in Nevada or here at home. I felt good . . . there was a certain sense of achievement when the first 5 MeV beam was produced at LAMPF . . . Oh, I didn't do it, but I felt good about it when it happened. And then there are administrative problems you work your way through, and when you do, you feel a satisfying sense of accomplishment.

"Schreib and I have kind of divvied up the business. We keep each other informed so that each of us knows enough about the other's business to function in the other's absence.

"The job used to be more fun than it is now. Back in the early days when you needed something you got it and there were no questions asked. Now things are becoming more departmentalized, there is more bureaucracy and Washington thinks more about waste disposal, money, property control, audits and things like that. You fight off all kinds of rules and inspections, but you don't get rid of the problem, you only delay it."

The finale of Bradbury's directorship was two days of ceremonies honoring him for his quarter century of service. It crescendoed to the presentation of the coveted Enrico Fermi Award. Probably no one (except Bradbury) was surprised to have heard that the LASL director was selected to receive the award, which consists of \$25,000, a gold medal and a citation, for his contributions to the nation's atomic energy program have been many.

Prior to the two-day event Bradbury had been honored with a resolution from the University of California regents at a special dinner.

Among the many awards and honors received by Bradbury is the Navy's Legion of Merit, which he received in 1945. He holds honorary doctor of science degrees from Pomona College and Case Institute of Technology and an honorary doctor of laws degree from the University of New Mexico. In 1960 he received a certificate of appreciation from the regents of the University of California "for the great contribution he has made in research and development in nuclear and thermonuclear science, and for the prestige he has brought to the Laboratory and the University." This presentation was made on the anniversary of Bradbury's 15th year as director of the Laboratory.

In 1964 he received the annual New Mexico Academy of Science Achievement Award and in April 1966, the Department of Defense Distinguished Public Service Medal. The DOD award was for "exceptionally meritorious civilian service to the Armed Forces and the United States of America in a position of great responsibility as director, Los Alamos Scientific Laboratory. . . . The outstanding international reputation of the Los Alamos Laboratory is directly attributable to his exceptional leadership. The United States is indebted to Dr. Bradbury and his Laboratory, to a very large degree, for our present nuclear capability."

In February of 1968, Bradbury received the Atomic Energy Commission citation during ceremonies observing the Laboratory's 25th anniversary. This citation is the highest award given by the AEC and is presented to private individuals and employees of AEC contractors who have made especially meritorious contributions to or have been clearly outstanding in the nuclear energy program.

Bradbury is a Fellow of the National Academy of Sciences, a Fellow of the American Physical Society, and a member of Phi Beta Kappa and Sigma Xi. He served as a member of the U.S. Air Force's Scientific Advisory Board and on the Science Advisory Committee in the Office of Defense Mobilization from 1955 until 1957.

Bradbury has also been active in his community and state. He participated in organizing the first Cub Scout pack in Los Alamos and was a charter member of the town's YMCA. He was the first commanding Officer of U.S. Naval Reserve Research Company 8-9 in Los Alamos (Feb. 1, 1950-June 30, 1951). He retired from the Navy with



Above, Bradbury was awarded the Enrico Fermi Award by AEC Chairman Glenn Seaborg amidst a standing ovation by both audience and on-stage dignitaries. From left are John Canaday, regent of the University of California; Carl Walske, assistant to the Secretary of Defense for Atomic Energy; Clarence Larson, AEC commissioner; Representative Chet Holifield, chairman of the Joint Committee on Atomic Energy; and James Ramey and Theos Thompson, both AEC commissioners. Behind Seaborg are Bishop C. James Kinsolving III (partially hidden), and USAF Major General Edward Giller.



Shortly after receiving the Enrico Fermi Award, the former director grinned his appreciation at ceremonies dedicating the Norris E. Bradbury Science Hall. Observing the new name above the museum's entrance are Admiral John Hayward (USN retired), vice president of General Dynamics, and Mrs. Bradbury.



the rank of Captain in 1961. He has served as a trustee, president and vice president of the Los Alamos County Board of Education. He is currently a member of the Board of Regents of the University of New Mexico. He has been a member of the Board of Regents of the Museum of New Mexico and president of the New Mexico Archaeological Society. He has been a member of the Los Alamos Medical Center Advisory Board since January of 1964.

Until 1951, when he was appointed a professor of physics at the University of California, Bradbury had been on leave as professor of physics at Stanford. He has been on leave from the University's Berkeley campus to conduct his work at Los Alamos.

Today the Laboratory, which survived post-war uncertainties under his direction, has more than 4,000 employees, a capital investment of more than \$260 million, and an annual operating budget of over \$100 million. Not only has Los Alamos continued to be one of the nation's foremost nuclear weapons laboratories, but it now engages in a wide range of other nuclear research.

Bradbury is shown with Harold Agnew who became LASL's new director effective Sept. 1.

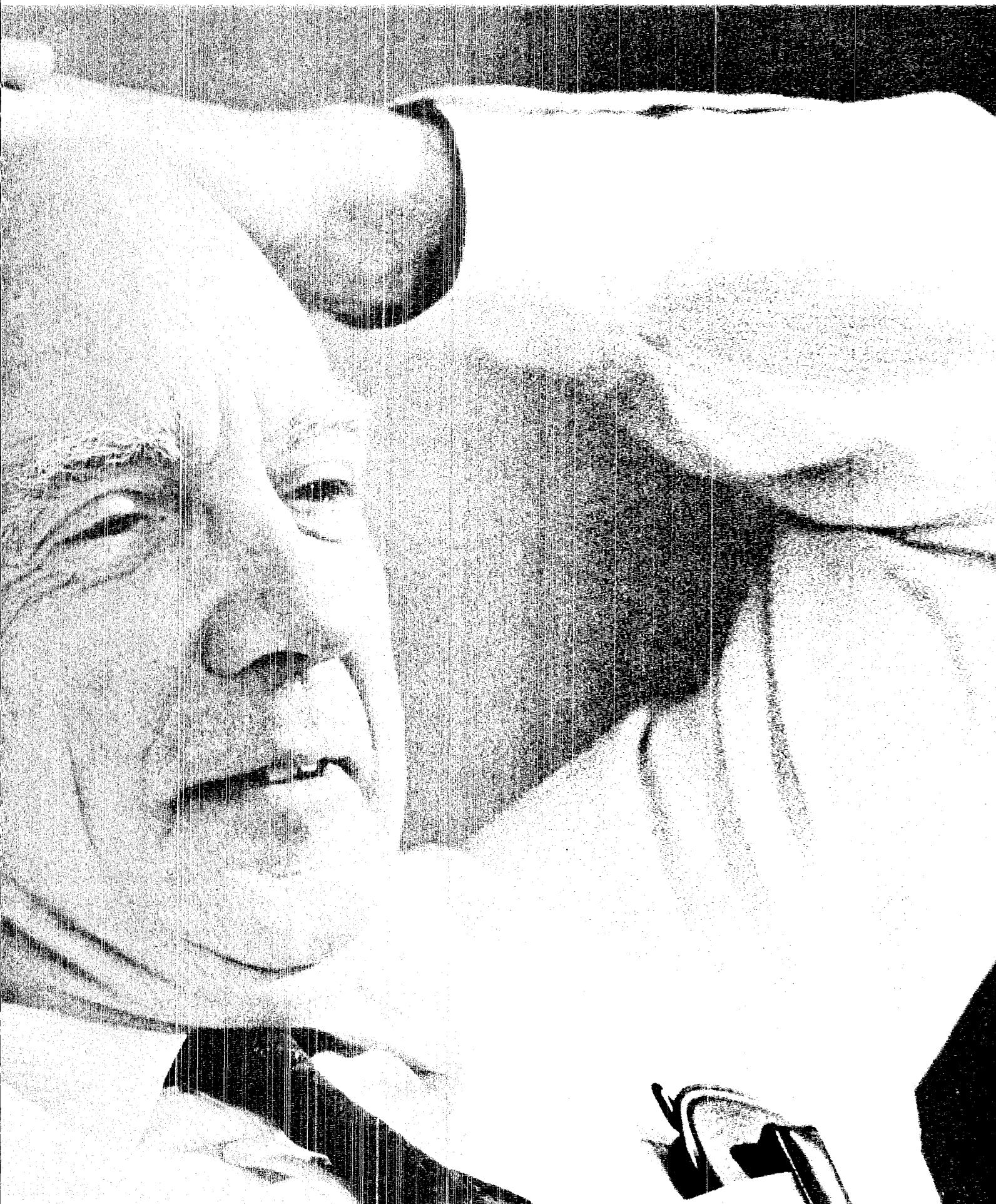
Although a firm believer in this country's nuclear deterrent and a strong proponent of the 1963 Limited Nuclear Test Ban Treaty, Bradbury perhaps best expressed the feelings of the country when he closed his testimony before the Senate hearings on the nuclear test ban treaty by saying, "I myself, with considerable knowledge of nuclear things, with some knowledge of their military use, but with only a plain citizen's feelings about people and nations and hopes and fears, would prefer to try to follow the path of hope."

The proper word for Bradbury's leaving the Laboratory is "resigned." "When a man says he's going to retire, you immediately start thinking about a rocking chair," he said. "I'm not ready for one. We're going to continue to live here in Los Alamos. I don't know of anywhere else I'd prefer to go. I have no plans to take a job somewhere else. I'll probably devote more time to the University of New Mexico regents job, and we'll probably visit Mexico again."



"It's
been
fun"





THE ATOM

Los Alamos Scientific Laboratory

September, 1970